CHAPTER III:

Environmental Resources

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INTRODUCTION

Amherst is graced with an abundance of natural resources. There are lakes and ponds, not so big to invite noisy crowds, not so small to pave over. There are wetlands; large, bountiful and fecund enough to deserve the State prime wetlands designation and to harbor rare species. There is a river to provide exciting spring whitewater canoeing, lazy summer family outings and all year long the dutiful recharge of the aquifer beneath it. Forests stretch all about in every view; harboring four-footed and feathered wildlife with food and shelter and enjoying their own quiet push for the sun.

The Amherst Conservation Commission, appointed town officials operating under State of New Hampshire ordinances, present this section of the Amherst Master Plan with the hope that its exposés and guidance will alert citizens to the fragility of the open space around them and provide ways to conserve it. Mighty trees are fragile to the bulldozer for the next subdivision, clean water in Baboosic Lake and the Ponemah Bog are susceptible to the drip of phosphorus from nearby leach fields and rare turtles can be collected out of existence.

Where is this 'open space' anyway? We may drive around for days without encountering any. You may feel that conservation is not your concern. Try this simple paper or mental exercise: Lay out a map of Amherst and, with a fat ink marker, black out all the roads including one hundred feet on either side of the road. Black out all the area in subdivisions and include the same one hundred feet around the edge of the subdivision. Now stare at the result. Ignore the black; that's where the humans are. Concentrate on the white squares, trapezoids and swaths of white space. That's where the animals and trees are. There is quite a lot of white open space in Amherst between the road and house lots. The following are recommendations intended to guide both the townspeople and Planning Board on issues surrounding environmental research.

TOPOGRAPHY AND SLOPE

Topography is the general form of the land surface. Elevation and slope are the two major components of topography. Elevation is the measure of the height of a given point of land relative to mean sea level. Slope is a measure of the pitch or steepness of land between two points. In general the topography of Amherst varies from low-lying wetlands to rolling hills and peaks over 700 feet in elevation. The southern and central sections of the Town are generally low and flat with an expansive floodplain along the Souhegan River. In the west, with the exception of the Beaver Brook area, elevations start at approximately 300 feet and climb to 600 feet at the peaks of Christian Hill, Patch Hill and Eagle Rock. In northern Amherst, the relatively low areas of the Joe English Brook and Baboosic Lake subwatersheds are countered by the over 700 foot peaks of Mack Hill, Walnut Hill and Chestnut Hill.

Slope is one of the limiting factors to be considered when determining the development potential of a parcel of land. Information on slope is generally considered in conjunction with the other environmental factors of geology, soils and hydrology. Increases in slope result in corresponding increases in the difficulty and cost of site development. Generally speaking, slopes of 0 to 3 percent are not well drained and are often associated with wetlands. Land with slopes of 3 to 8 percent and good soil conditions is usually considered ideal for development

because constraints are minimal. Development on slopes of 8 to 15 percent will require some additional planning to provide proper drainage and soil stabilization. While areas with slopes of 15 to 25 percent are developable, shallow soils and increased potential for erosion require site specific considerations to alleviate negative impacts. Land areas with slopes greater than 25 percent are considered undevelopable because of shallow soils, increased erosion potential, complexity of road and site construction and inability to support on-site waste disposal systems. While areas with slopes exceeding 25 percent may be found throughout the Town, they are predominantly associated with the areas of highest elevations, Mack, Chestnut, Walnut, Christian and Patch Hills and Eagle Rock. Slope is also a critical factor when siting septic systems to ensure adequate drainage and filtration.

SOILS

Soil is a principal determinant of the land's development capability, particularly in areas that rely on subsurface waste disposal. Depth to water table and bedrock, susceptibility to flooding, slope and permeability are factors affecting the suitability of a site for roads, buildings and septic systems.

The USDA Soil Conservation Service, now known as the Natural Resources Conservation Service (NRCS), conducted extensive surveys and analyses of soil conditions in Hillsborough County during the 1970s and published the *Soil Survey of Hillsborough County, New Hampshire, Eastern Part* in 1981. The *Soil Survey* delineates soil boundaries and provides information on the characteristics of individual soil types. Each soil is evaluated and rated with regard to development potential for specific land uses such as crops and pasture, forestry, recreation, wildlife habitat, building site development and sanitary facilities. Amherst soils are depicted on Map III-1.

The soil surveys are mapped at a scale of 1:20,000. At this scale, the smallest soil units mapped are approximately 3 acres. Each map unit represents an area that consists of one or more soils. The name and symbol for the map unit is based on the dominant soil type. Most map units include small scattered areas of other soil types with properties that may differ substantially from the dominant soil. Because of these limitations, the information provided in the *Soil Survey* is most useful for general planning purposes like this Master Plan. On-site soil evaluations should be conducted to ascertain the suitability of a specific site for a proposed use.

The Society of Soil Scientists of Northern New England recently adopted the *Site Specific Soil Mapping Standard for New Hampshire and Vermont*. These standards classify soils to the series level, consistent with the maps found in the *Soil Survey*. The new standards will replace the High Intensity Soil Survey (HISS) standards currently used in many communities, including Amherst. The Planning Board should amend the Subdivision and Site Plan Regulations to require the use of the *Site Specific Soil Standards* for future applications.

To assist communities in planning for future development based on soil capabilities, the Hillsborough County Conservation District devised a rating system to indicate the relative potential of a soil for development, *Soil Potentials for Development Hillsborough County, New Hampshire*, March 1986. Soils were evaluated in four categories, septic tank absorption fields, local roads and streets, dwellings with basements and overall development. Five rating classes, very high, high, medium, low and very low, were established based on a numerical

MAP III-1
SOILS

Agawam	AgB
Borohemists	BoA
	BpA
Canton	CaB
	CaC
	CaD
	CmB
	CmC
	CmD
	CmE
	CnC
	CnD
Chatfield	CpB
	CpC
	CpD
	CsB
	CsC
	CtD
Chocura	Cu
Deerfield	DeA
	DeB
Greenwood	Gw
Hinkley	HsA
	HsB
	HsC
	HsD
Leicester	LtA
	LtB
	LvA
	LvB
Montauk	MtB
	MtD
Occum	Oc
	Om
Paxton	PbB
	PbC
	PbD
	PfB
	PfC
	PfD
	PfE
Pipestone	PiA
Pits	Pr
Pootatuck	Pu
Ridgebury	RbA
	ReA
	ReB
Rippowam	Rp
Saco Variant	Sm
Saugatuck	Sn
Scarboro	So
	Sr
Scituate	SsA
	SsB
	SsC
	StA
	StB
	StC
Suncook	Su
Udipsamments	UdA
Urban	Ur
Windsor	WdA
	WdB
	WdC
	WdD
Woodbridge	WoA
	WoB
	WvB

Source: Hillsborough County Soil Survey, 1981

comparison of the soil with a theoretical reference soil. Since the entire Town is served by septic systems, the septic tank absorption field category is most significant for Amherst. The characteristics of the reference soil for the septic system absorption field include: the area is located on a gently sloping area of five percent slope; the depth to the high water table and bedrock is greater than ten feet; the area is not subject to flooding; there are less than three percent surface stones; and the soil has a percolation rate of twelve to fifteen minutes per inch. In Amherst, approximately 7,720 acres are rated as having a low or very low potential for septic absorption fields. These locations are depicted on the Development Constraints Map, Map VI-3 in Chapter VI.

FLOODPLAINS

During times of high runoff, floodwaters can damage buildings or structures located within the floodplain. In the past, damaging flood waters were a major hazard as the moderate slopes, good agricultural soils, and the use of rivers for transportation encouraged settlement within floodplain areas. In an effort to protect against the damaging aspects of flooding, the Federal Insurance Administration (Department of Housing and Urban Development) has conducted studies and mapping of floodplain areas throughout the region under the National Flood Insurance Act of 1973. As a result of these efforts, most communities have adopted restrictions to govern development within floodplain areas.

Based on statistical calculations, three specific zones were delineated and assigned a flood insurance zone designation based on the probability of a flood event, as follows:

Zone A: Special Flood Hazard Areas inundated by the 100-year flood. There is a one percent chance that this level of flooding will occur in any given year.

Zone B: Areas between the Special Flood Hazard Area (Zone A) and the limits of the 500 year flood, including areas of the 500 year floodplain that are protected from the 100 year flood by dike, levee or other water-control structures; also areas subject to certain types of 100 year shallow flooding where depths are less than I foot; and areas subject to 100 year flooding from sources with drainage areas less than I square mile.

Zone C: Areas of minimal flooding.

Floodplains in Amherst are widest and most extensive adjacent to the Souhegan River and Beaver Brook. Narrower floodplains lie adjacent to Witches Spring Brook, the unnamed stream south of Baboosic Lake, Baboosic Lake and Pulpit Brook, and Joe English Brook (extending also northeast to Damon Pond and southwest to Lincoln Pond). Many of these floodplains encompass large wetland areas.

The 1979 Flood Insurance Study prepared by the US Department of Housing and Urban Development, Federal Insurance Administration, identifies the principal flood problems in Amherst: major floods occur on the Souhegan River during the spring, fall, and winter seasons. Some of the most severe flooding occurs in early spring as a result of snow melt and heavy rains, in conjunction with ice jams. Autumn is another critical season for flood danger because of heavy rainfall and the possibility of storms of tropical origin. Minor flooding in

Amherst can occur at any time of the year, as even heavy thunderstorms can result in rapid runoff and flooding in the downstream portions of the smaller streams. Repeated damage to structures in the flood plains has occurred in 1936, 1951, 1953, and 1960, with the 1936 flood being the largest of record.

AGRICULTURE

The value of agriculture in Amherst is its social and aesthetic contribution to Amherst's 'image' as maintaining a rural, open community. While it is desirable that all of Amherst's farmland remain in active agricultural use, it is unlikely that this will be possible due to the nature of the development market and increased land values in Southern New Hampshire. It is, however, important that this essential aspect of the Town's heritage be preserved.

As land values increase and farmers begin to value the earning power of their farm versus the value of their land to residential or commercial use, there will be great pressure to sell this land. The effect will be the loss of our more rural setting. Given that Amherst citizens have consistently voted in favor of maintaining their rural, open community by transferring a sum of money equal to 50% of the current use recovery money paid for land coming out of current use to the Conservation Commission, it would be advisable for the Town to continue being directly involved in supporting the purchase of agricultural land by the Commission. Furthermore, it should also be protected since much of this open land contributes to the maintenance and protection of the watershed and water supplies.

In addition, the farmer must be willing to sell the development rights to the Town or the Conservation Commission. Some farmers may not be able to sell their land because they view their land as the 'pension' they do not otherwise have and are hesitant to part with some of its value. Recent examples of land purchases for conservation purposes, such as the purchase of a house adjacent to the Joe English conservation properties, could be used as models to illustrate the financial advantages to landowners of selling property to the Conservation Commission and to exemplify the special sense of donation to their community. The Town should continue to support opportunities to maintain its open rural atmosphere.

Amherst also protects the use of land for agriculture and farming through the local zoning ordinance: "... right to farm is a natural right and is allowed to exist as a permitted use in Town of Amherst subject to the restrictions and regulations of the Town of Amherst and State Health and sanitary codes for intensive fowl and livestock farms...". Legislation such as this supports our agricultural roots while maintaining opportunities to preserve our rural atmosphere. This section of the Zoning Ordinance, however, seems to apply to large, single lots while the majority of the remaining parcels of land in Amherst are not large enough to support large scale agricultural operations. The Ordinance should be amended to permit the use of smaller parcels of land for agriculture such as vegetable and flower crops, sheep, goats, cattle and horses without excessive regulations.

While it is difficult to define how much of the existing active farmland can be preserved or even if converting land into agricultural use is feasible, one can reason that large parcels of land would have the highest chance of economic viability for agriculture. Thus, the Town may want to draft legislation which would provide additional tax incentives for maintaining large blocks of active agricultural land or for the conversion of land to agricultural uses. Given the fact that open land places less of a tax burden on the Town and its residents than residential or

commercial developments, providing a tax incentive for active agricultural land would not significantly increase the tax burden on other Town residents. Decreasing the tax burden on land being used for agricultural purposes is good for the farmer and good for those searching for ways to maintain Amherst's more rural life style.

FOREST RESOURCES

The forest has been the dominant landscape characteristic of the area since the last glaciers left 12,000 to 16,000 years ago. Before 1623 and the colonization of NH, the area was 93% forested, with the 7% open space being beaver marshes and some land along the Souhegan River cleared by native Americans for agriculture. By 1850, at the height of agricultural development in NH, only 20% of Amherst was forest, while 80% was cleared land used for grazing sheep, cattle and horses and growing crops. After 1865 and the end of the Civil War, agriculture dramatically declined and the forest re-occupied most agricultural lands. This change occurred for 3 reasons:

1. Many farmers moved west to occupy the new farmlands being made available west of the Mississippi River.

2. Better transportation provided by the railroads facilitated the import of agricultural goods from farther away and the export of people out of the area.

3. The Amoskeag Mills in Manchester (incorporated in 1831 and by 1910 was the largest textile mill in the world, employing 17,000 workers) and the mills in Lowell and Lawrence drew workers (particularly females) from the rural areas to the cities.

Presently, Amherst is 75% forest, with the 25% open space being developed land, wetland and farmland. Statewide, developed land is increasing at the rate of 2.5% each year.

As the forest has been shifting over the landscape because of human influences, the character of the forest has also changed. Insects and diseases have changed the look of the forest from pre-colonial times. The American chestnut tree has been eliminated from our forests by a fungus introduced from Asia in the 1880's. The American elm has been eliminated as a valuable street tree by the introduction of Dutch elm disease from Europe in the 1930's. American beech trees have been reduced in the forest by beech bark disease, introduced from Europe to Nova Scotia in 1920. Gypsy Moths escaped from scientist Leopold Trouvelot's home on 23 Myrtle Street in Medford, Massachusetts in 1868 and are a serious defoliator of hardwood forests on an approximate 10 year cycle. The Hemlock Woolly Adelgid was introduced in 1924 from Asia and has moved from New York into Connecticut and Massachusetts and is expected in the Amherst area in our lifetime.

In spite of this, New Hampshire is 83% forest (the 2nd most forested state after Maine) and the forest industry is the 3rd largest in the state (after tourism and manufacturing). White pine trees have been the backbone of the timber industry since colonial days, (Hillsborough County still leads the state in white pine sawlog production), and today, some of our best red oak and sugar maple are sought by export buyers. In Amherst, firewood is still widely used as a supplemental heat source.

As development and population has increased, however, the forest resource of Amherst is being valued more for scenic pleasure, wildlife habitat, recreation, watershed protection, air

pollution control and noise abatement. Protecting the forest is becoming a priority of the Town. More than 1,500 acres have been acquired and are being managed by the Town Conservation Commission. The lots and their acreages are depicted on Map III-3, Conservation Lands Map, along with a table listing their acreages.

The Amherst village center has been identified as a unique and valuable resource. A 1985 opinion survey ranked the respondents number one goal to "preserve and enhance the small town character of Amherst and its unique colonial center". Municipal street trees and privately owned shade trees and shrubs are an integral part of the historic buildings and village landscape. Many of the street trees have reached maturity and planning should be done to provide replacement trees when necessary. In most communities, planting replacement trees lags behind removing dead tress. Almost always, the budget for tree removal exceeds that for tree planting.

When planting street trees, care should be taken to select from a diversity of appropriate species, thus avoiding what is now recognized as an over planting of a single species. A diversity of plantings insures against catastrophic loss to insects or disease, as happened with our beautiful elm trees. Also, trees do indeed grow, and the correct size tree at maturity should be planted in the appropriate space regarding overhead wires, sidewalks, signs and possible underground utility excavation.

On private property, new home construction should recognize the value of retaining undamaged landscape trees or planting trees as needed. Simply having mature hardwood trees on the south side of a house will reduce the winter heating costs and summer cooling costs by 10%. Leaving groups of trees as natural areas around residences also reduces the area devoted to lawns, and the associated impacts of fertilizer, pesticides, watering and the noise and pollution of mowing. Trees also help residences blend into the landscape.

WETLANDS

Wetlands are low-lying, nearly level, swampy areas generally characterized by the water table sitting at or near the surface. Once considered merely a nuisance, wetlands are increasingly recognized for their role in maintaining hydrologic and ecologic stability. Wetlands can perform functions such as flood control and natural stream flow regulation, erosion control, and water purification while providing nursery grounds and habitat for numerous wildlife species.

Wetlands have been identified by soil type, hydrography, the presence of hydrophytic vegetation or a combination of these factors, depending on the agency or organization doing the identification. The Amherst Zoning Ordinance defines wetlands based on soil type: poorly or very poorly drained soils. Table III-1 contains a list of the wetland soil types found in Amherst. Amherst contains many extensive wetland areas, primarily in lower-elevation southern and eastern parts of town, as well as several small, isolated wetlands. Wetlands are depicted on Map III-3, Conservation Lands and Wetlands.

Of particular note is the Ponemah Bog and fen located south of Stearns Road. This is a small watershed with no outlet. The Bog is owned by the Audubon Society, and is highly prized because it is "a classic graminoid dominated fen of approximately 7-8 acres. This fen along with Ponemah Bog and Little Honey Pot Pond comprises an outstanding peatland

complex perhaps not equaled elsewhere on the lower Merrimack valley." (*An Ecological Inventory of Significant Wetlands*, May 1993).

The Wetland Conservation District permits the following activities in wetlands: forestry/tree farming, agriculture, wells and well lines, wildlife refuges, parks and recreation uses suitable in wetlands, conservation areas and nature trails, open space and minimal impact crossings for roads and driveways. In addition, wetland areas can not be used to satisfy minimum lot size requirements, septic tanks and leachfields must be set back 75 feet from the edge of the wetland and no structures can be erected within 50 feet of the edge of the wetland.

With regard to wetland regulations, the Conservation Commission and the Planning Board should work together to evaluate the existing regulations and make recommendations for changes. One change would be to require a natural vegetative buffer be maintained within the 50 foot structure setback. Vegetated buffers decrease nonpoint source pollution by stabilizing the soil and preventing erosion, decreasing the velocity of runoff and removing nutrients from the runoff. The Town should also consider designating significant wetlands, such as Ponemah Bog and Stump Pond as prime wetlands. The prime wetlands designation will provide these area with greater protection at the State level and will increase scrutiny of projects adjacent to these areas.

TABLE III-1
WETLAND SOILS
AMHERST, NEW HAMPSHIRE

Symbol	*Soil Map Unit*
Poorly Drained	
LtA	Leicester-Walpole complex, 0-3% slope
LtB	Leicester-Walpole complex, 3-8% slope
LvA	Leicester-Walpole complex stony, 0-3% slope
LvB	Leicester-Walpole complex stony, 3-8% slope
PiA	Pipestone loamy sand, 0-3% slope
RbA	Ridgebury loam, 0-8% slope
ReA	Ridgebury stony loam, 0-3% slope
ReB	Ridgebury stony loam, 3-8% slope
Rp	Rippowam fine sandy loam
Sn	Saugatuck loamy sand
Very Poorly Drained	
BoA	Borohemists, nearly level
BpA	Borohemists, ponded
Cu	Chocorua mucky peat
Gw	Greenwood mucky peat
Sm	Saco Variant silt loam
So	Scarboro mucky loamy sand
Sr	Scarboro stony mucky loamy sand

Source: Soil Survey of Hillsborough County New Hampshire, Eastern Part, US Department of Agriculture, Soil Conservation Service, 1981.

WATER RESOURCES

An abundance of water is one of Amherst's greatest natural resources, creating many scenic and recreational sites, and providing the key for an amazingly diverse ecology. Amherst has the most extensive and productive groundwater resources in the region which supply drinking water for three towns. In Amherst, most water comes from on-site wells. The water supplied by the two water companies comes predominately from wells in Amherst. Milford's Curtis wells are located in Amherst and Pennichuck Water Works operates the old Village District Well off Thorntons Ferry Road and the Bon Terrain Well which also serves Nashua. Additionally, the Stump Pond area is part of the Pennichuck Brook watershed which is the main water supply for Nashua. At the same time there are no public sewer systems in Amherst, and most sewage disposal systems are on-site septic systems. Thus, hydrology and water resources are a major foundation for the Town's zoning.

SURFACE WATER AND WATERSHEDS

As described in the *Amherst Water Resource Management Update*, October 1990, Amherst is located in the Merrimack River Watershed. The central part of the Town including Honey Pot Pond, drains into the Souhegan River, via Caesar's Brook and Beaver Brook and/or other minor tributaries. From the base of Mont Vernon hill in the north of Town, to its entry into the Souhegan, Beaver Brook is associated with extensive wetlands. These include the Great Meadow across from the Wilkins School, and the formerly dammed wetland area between the Wilkins School and the Congregational Church. Beaver Brook drops behind Town Hall, an area of old mill sites, and flows under Rt. 122/Amherst Street. A small tributary from the 101/Police Station area flows through the Ross Bird Sanctuary and joins Beaver Brook at Thorntons Ferry Road forming another broad wetland along Boston Post Road. The wetlands continue along Corduroy Road where there is also a large man-made pond, Corduroy Pond. Finally, Beaver Brook crosses open meadows behind the Amherst Country Club where it joins the Souhegan River.

The northern section of town, including Joe English Pond and Joe English Brook (4.4 miles all in Amherst), Glen Echo Pond, Damon Pond, Lincoln Pond, Jake's Pond, Baboosic Lake and Little Baboosic Lake drains eventually into Baboosic Brook. It flows north out of Baboosic Lake for 1.1 miles in Amherst, turns east into a corner of Bedford and then through Merrimack to the Merrimack River. Pulpit Brook flows south along the Amherst Bedford border (2.5 miles in Amherst) and joins Baboosic Brook at the Bedford-Merrimack town line.

The very southern edge of Amherst along the Hollis border drains east via, Witches Brook and Pennichuck Brook through Nashua to the Merrimack River. Stump Pond on the north side of 101 A, is a dammed pond which is fed from the north by an unnamed stream and empties into Witches Brook via a stream flowing from the western edge. The Stump Pond area is part of the Pennichuck Brook system. Pennichuck Water works is currently conducting a study of the Pennichuck Brook watershed to assess water quality, define sources of pollution and identify actions to reduce pollutant loadings to the system. Phosphorous is the major problem in the Pennichuck Brook watershed. The *Pennichuck Water Works Watershed Management Plan* recommends the following actions to reduce the impacts of nonpoint source pollution on the Pennichuck Brook system:

1. Coordinate with the communities to require a 300 foot setback/buffer around all Pennichuck Brook tributaries, to limit impervious area on a site, to include provisions for water quality, particularly stormwater runoff, and to require a 300 foot setback for all standing and feeding places for hoses and livestock.

2. Develop an education program to inform the general public about the watershed, the impacts of bacteria and nutrients on water quality and to demonstrate the benefits of reducing bacteria and nutrient loadings.

3. Incorporate requirements for the use of structural best management practices (BMPs) to capture and treat stormwater before discharging it into a tributary or water body.

4. Conduct a sanitary survey of the entire watershed to identify faulty and failed septic systems, and illicit discharges.

Although the northern watershed is rocky and hilly, the area along Beaver Brook and the Souhegan River is flat, as is the river as it flows through Amherst. This section of the Souhegan is the largest floodplain area of the 31.8 mile river, encompassing almost the entire River corridor between Boston Post Road and Stearns Road, and extending outside the corridor to NH Route 101 A. The width of the floodplain in this area ranges from 1,400 feet to over 1 mile. The Witches Brook watershed is also flat and swampy.

An historic vacation spot once served by the B & M Railroad from Boston, Baboosic Lake with its interesting uneven shoreline, and tree covered slopes on the Amherst side, provides many recreational opportunities: swimming, canoeing, sailing, boating, water-skiing, fishing, ice fishing, ice skating and even ice boating. Three quarters of Baboosic Lake's shoreline is in Amherst, and the remainder is in Merrimack. While all of the Merrimack shoreline is privately owned, Amherst has public access at the town beach, which is used for swimming lessons and other recreational purposes. The Amherst town beach includes a five (+or-)acre park and has 465 feet of shoreline. It provided swim club benefits to over 116 families in 1997. Of this total 97 were resident families and 19 non-resident, with 230 adults and 278 children. A Director and staff of 12 lifeguards provided an instruction program for 185 children, and 58-60 were on the Baboosic Lake Swim Team. Amherst citizens need to be alerted to the importance of maintaining and protecting their attractive town beach.

Complaints in recent years about the declining water quality in the lake prompted the New Hampshire Water Supply and Pollution Control Commission (now NHDES WSPCD) to undertake a hydrological study which was completed in 1986. The *Baboosic Lake Study* confirmed signs of accelerated eutrophication. Eutrophication is "excessive fertilization of surface water which manifests itself in the form of noxious growth of floating and attached algae and aquatic macrophytes." In lay terms, excessive nutrients provide a fertile environment that produces an overabundance of algae, which "rob" the lake of oxygen and destroy the lake's delicate ecological balance. The study determined that the eutrophication resulted from increased nutrients draining into the lake from the watershed and identified two factors contributing to the nutrient level: 1) increased development in the watershed and 2) recent conversions of seasonal cottages to year-round use.

The study found the biggest concern to be the concentrations of the nutrient phosphorus in the lake. The sources of the phosphorus loading were found to be as indicated in Table III-2.

TABLE III-2
BABOOSIC LAKE PHOSPHORUS BUDGET

Source	*Percent*
Tributary Runoff	44.1
Residential Loading	42.0
Precipitation & Dryfall	10.8
Sediment Contribution	3.0
Total	99.9

Source: Baboosic Lake Study, WSPCC, 1986.

The most remarkable aspect of these data is the contribution from residential sources. Of the total residential loading, 61.4 percent came from year round homes compared with only 38.6 percent from seasonal cottages. At Baboosic Lake, watersheds sources contributed only 44.1 percent, compared with the 75 percent typically found at other New Hampshire lakes. The precipitation and dryfall component is average, and the sediment or in-lake contribution is insignificant. The study found that the majority of the residential loading came from the "Pavillion North" area, the "Pavillion South" area and the Merrimack shore.

The study presents the following conclusions:

1. The level of phosphorus is much higher than that found in other studies of New Hampshire lakes and is of concern;
2. The contribution of phosphorus coming from the watershed is about 30% less than average;
3. The contribution of phosphorus coming from 'residential sources is high;
4. Of the residential load, 61% comes from year round homes, and 39% is from seasonal homes; and
5. In addition to septic systems, the sources of the phosphorus may be: detergents used in the watershed; decaying leaves; past agricultural practices; erosion from construction sites; lawn and garden fertilizers; wild fowl excrement; and lake bottom disturbances caused by boats.

The WSPCC offered several general recommendations (See the *Baboosic Lake Study* for a more comprehensive list of recommendations):

1. Septic Systems: Conduct a detailed sanitary survey of first tier homes and cottages, determine occupancy and kind of fixtures, use of phosphorus products, age of dwelling, etc. Assess the health implications of the problem areas and alleviate problems when possible. Annually inspect septic systems of first tier residences and require regular pumpouts.

2. Lake Use: Establish a peak Use carrying capacity for town recreational facilities at the lake. Establish and enforce controls over boat speed and horsepower. Discourage bathing (cleaning), feeding of water fowl and the presence of seagulls (by containerizing refuse). Encourage establishment of a Lake Association. Support annual lay monitoring of the lake and biannual monitoring of the tributaries.
3. Land Use Controls: Amend ordinances as described in the report. Implement the best management practices described in the report which address pollution controls in the agricultural, silvicultural and development sectors. Provide the means to better educate the public about the need for watershed management controls to protect the quality of surface water bodies.
4. Phosphorus Controls: Consider the imposition of a phosphorus detergent or clothes washer ban in the watershed. Educate the near shore residents to the deleterious effects of overuse of lawn fertilizers on the lake quality. Impose strict sediment and erosion controls on developers during the construction period.

Lake shore residents have been monitoring the lake's water quality at two locations weekly during the summer since 1983. The volunteer "lay monitors" submit samples and data to the Lay Lakes Monitoring Program of the University of New Hampshire, Freshwater Biology Group (FBG). FBG staff interpret the results of the simple tests conducted by the lay monitors and produce a brief report about the lake's water quality each year. Careful, consistent sampling over time creates a database from which it is possible to analyze lake water quality trends. FBG staff recommend that monitoring begin in April or May each year. Currently, one of the major problems facing the Baboosic Lakes Association is sea gulls. Although the gulls disappeared when the Amherst open dump closed, they are back since the Merrimack dump is still open.

The Amherst Health Officer has inspected septic systems and monitored waste disposal for over 30 years. He reports that while public health is generally under control, the whole waste system on the lake is tenuous and fragile because nearly all the over 150 seasonal cottages in Amherst are on nonconforming lots (1/4 acre) predating Amherst's Zoning Ordinance. In the beginning, many were probably camps with outhouses, which results in a much slower release of wastes and nitrates into the ground water. Today, the expected occupancy of these seasonal cottages is three months, in reality the Health Officer notes it is much longer, beginning in the spring and lasting into the fall and including weekend usage during the winter. Amherst town officials must maintain constant vigilance to monitor unauthorized conversion of seasonal cottages into year-round residences, requiring much time and expense to the Town. The Health Officer recommends an annual mandatory septic system pumping program for the seasonal and year-round residential units that ring the lake. In addition, the Town should pursue funding from the NH Department of Environmental Services to conduct a septic system inspection program to identify failing systems and to develop and implement a landowner education program. In addition, the Town should investigate all opportunities to sewer the Baboosic Lake area to eliminate a major source of pollution.

The Souhegan River is the most significant water course in Amherst providing recreational opportunities and water for irrigation. In 1995, the Nashua Regional Planning Commission completed a comprehensive study of the river and its watershed, *Souhegan River Watershed Study*. The *Study* contains a wealth of information on the River and the communities that comprise the watershed. The goal of the *Study* is to conserve and manage the river and its

corridor in association with the other towns in the watershed. Water quality should by protected and improved. Significant natural, historic, scenic and recreational resources must be recognized and preserved. Appropriate balancing of the continuing multiple uses of the Souhegan River and corridor must be provided. In order to meet these goals, objectives were identified:

1. Restore and protect water quality.
2. Protect water quantity.
3. Raise public awareness of, and appreciation for the River and its natural, historic, scenic, and recreational resources.
4. Provide and increase public access to and use of the River.
5. Develop a greenbelt along the River shoreline.
6. Maintain a variety of habitats to promote a diversity of wildlife within the corridor and greenbelt.

At present, there are two wastewater treatment plant discharges and three industrial discharges to the Souhegan River. The Greenville and Milford wastewater treatment plants discharge an average 0.12 and 1.22 million gallons per day to the Souhegan River. Harcros Chemical, Inc. in Merrimack, Hitchiner Manufacturing Co. in Milford and Souhegan Wood Products, Inc. in Wilton all discharge non-contact cooling water. Hitchiner Manufacturing is the largest industrial discharge with an average daily volume of 300,000 gallons per day. Souhegan Wood Products discharges 15,000 gallons per day on average an Harcros Chemical does not record or report flows to the NH Department of Environmental Services.

Overall water quality in the Souhegan River is good and the standards for Class B waters are consistently met. In addition to State water quality information, the Souhegan Watershed Association (SWA) resumed the annual volunteer monitoring program in 1997 with 13 sites on the Souhegan. The results of the past years monitoring were very similar to the results of the previous program conducted from 1990 to 1995. Water quality problems exist in Amherst at the 122 Bridge. This site repeatedly exceeded the water quality standard for swimming areas of 88 E. coli colonies per 100 ml. This presents some concerns for community health since this area is a popular swimming hole.

Water quality is also important since the Souhegan is the premiere nursery habitat for the Atlantic Salmon Restoration Program with over 100,000 Atlantic salmon frye stocked annually. Even minor changes in temperature and dissolved oxygen can have a severe impact on fisheries and other aquatic species. Therefore it is important that shoreline vegetation be maintained.

The Comprehensive Shorelands Protection Act (RSA 483-B) which became fully effective on July 1, 1994, sets minimum standards to protect and conserve public water bodies in the State. These are natural ponds or artificial impoundments of ten acres or larger, and fourth order or higher rivers. The Act states in Section V. (a)(1): "Where existing, a natural woodland buffer shall be maintained within 150 feet of the reference line. The purpose of this buffer shall be to protect the quality of public waters by minimizing erosion, preventing siltation and turbidity, stabilizing soils, preventing excess nutrients and chemical pollution, maintaining natural water temperatures, maintaining a healthy tree canopy and understory, preserving fish and wildlife, and respecting the overall natural condition of the protected shoreland." In Amherst this Act applies to: the Souhegan River, Baboosic Lake, Little Baboosic

Lake or Weston Pond, Damon Pond, Joe English Pond, Lincoln Pond, Honey Pot Pond and Stump Pond

GROUNDWATER

Groundwater from stratified drift unconsolidated till deposits and bedrock provides water for residential, commercial and industrial uses in Amherst. Stratified drift aquifers are composed of well sorted sands and gravels which generally have the potential to yield large quantities of water. Approximately 13.5 square miles, or 40 percent of the Town, are underlain by stratified drift. Stratified-drift aquifers are widely scattered throughout the Town and vary greatly in areal extent and saturated thickness as depicted on Map III-2. Because of their ability to store and transmit large volumes of water, stratified drift aquifers are central to groundwater investigations in the northeast United States, and are potentially the most favorable source of high-yield water supply in Amherst.

The USGS study *Hydrogeology of Stratified Drift Aquifers and Water Quality in the Nashua Regional Planning Commission Area, South-Central New Hampshire*, describes the stratified drift aquifers in Amherst as follows:

> The largest aquifer in Amherst is located along the Souhegan River, extending from Milford to Merrimack and southward to Witches Brook. The deep, central part of this aquifer consists of 25 feet of coarse-grained sand and gravel overlying 75 feet of fine-grained materials. Near the Milford line along its western edge, at the mouth of Beaver Brook and toward Witches Spring, the stratified drift is coarse grained. Although the saturated thickness exceeds 100 feet in the center of this aquifer usable saturated thickness is limited to about one third to one half of that shown on plate 4 [of the *Hydrogeology of Stratified-Drift Aquifers and Water Quality in the Nashua Regional Planning Commission Area, South Central New Hampshire*, Kenneth W. Toppin, USGS Water Resources Investigations Report 86-4358, 1987) because of the low permeability, fine-grained stratified drift under the coarse-grained material. In the coarse-grained material near the aquifer boundaries, saturated thickness is less than 60 feet. Transmissivity is greater than 8,000 square feet per day throughout most of this area. Milford's municipal wells (wells W-73, W-74), which pump 400 and 700 gallons per minute, respectively, are at the western end of this aquifer near the Milford town line. Merrimack well W-146 [Merrimack Village District's Well No. 6) which pumps in excess of 500 gallons per minute is located in the southeastern part of this aquifer in South Merrimack.
>
> The Amherst village district well (site W-11, 18) is located in the stratified-drift deposit South of the town center along Beaver Brook. The well yields 200 gallons per minute from coarse-grained sand and gravel that has a saturated thickness of about 70 feet. Saturated thickness decreases upstream from this point.
>
> Transmissivity of the Beaver Brook aquifer generally is less than 8,000 square feet per day except near the mouth of the brook where it exceeds 8,000 square feet per day.
>
> Additional municipal supply wells might be possible in the permeable material down stream of the current town well where the extent and saturated thickness of the aquifer are greatest and where supplemental induced recharge from Beaver Brook could be obtained.
>
> East of the Beaver Brook watershed, the small aquifer that extends northwest to southeast from Baboosic Lake Road to Upham Road has less than 40 feet of saturated thickness. Coarse-grained material overlies fine-grained material, and transmissivity is greater than 8,000 square feet per day in the central part of this aquifer.

Glacial till aquifers generally consist of shallow, poorly sorted glacial deposits overlying bedrock. The aquifers generally provide relatively low volumes of water although they are more than adequate for average domestic use. Glacial till occurs most extensively in northern Amherst and least extensively in southern Amherst.

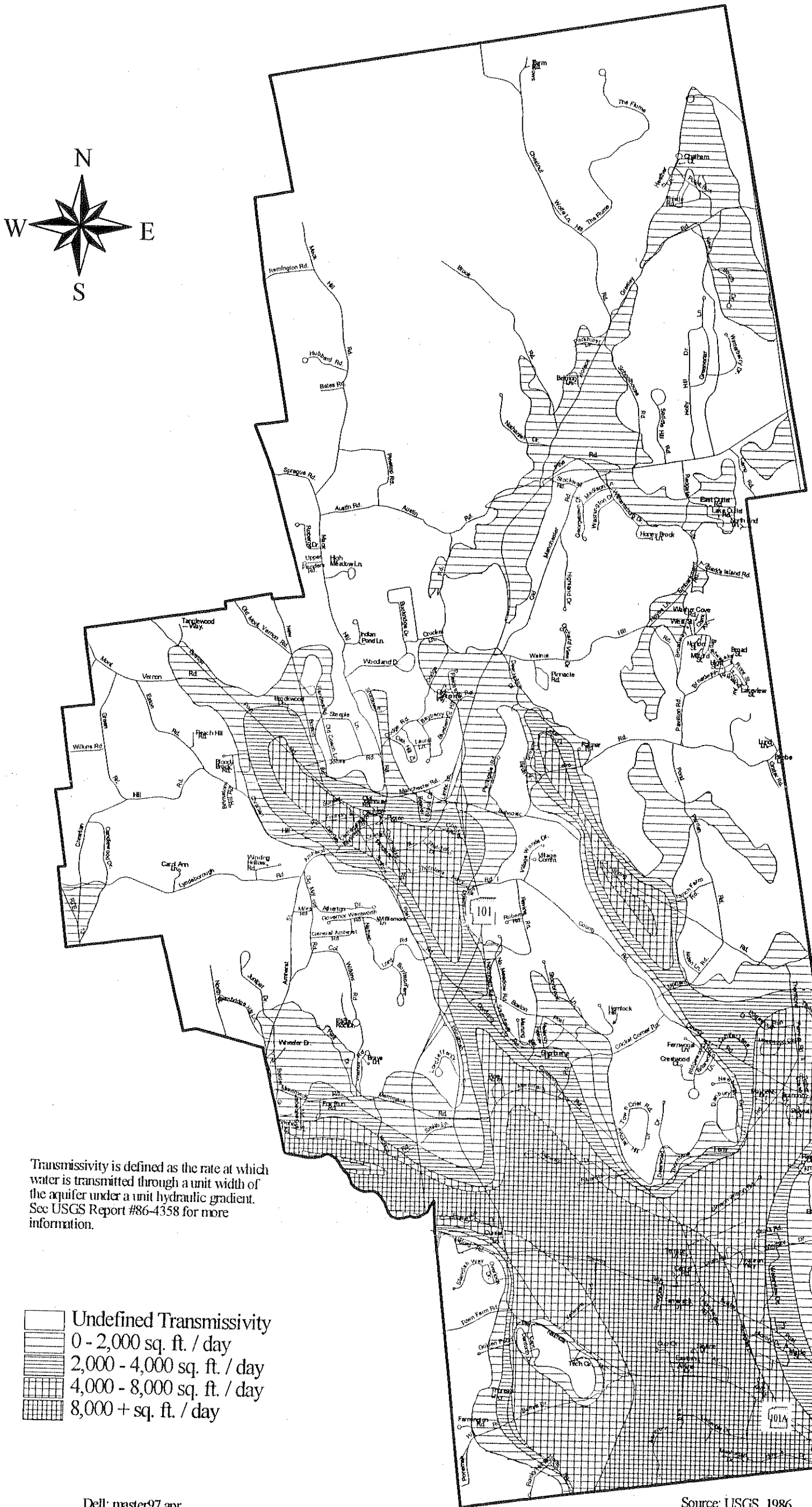
A study of the bedrock aquifers in Amherst was completed for the Town by Wagner and Associates, Inc. in 1985. The purpose of the study was to delineate the bedrock aquifers to facilitate groundwater protection efforts. Information was obtained from "examining the geology and collecting information about wells throughout the Town." No detailed, site specific, studies such as drilling or geophysical surveys were undertaken.

The Wagner and Associates study identifies twelve distinct bedrock aquifers either located in or recharging from Amherst. Most of the area north and west of Route 101 provides either primary or secondary recharge for these aquifers. Other areas are (1) Walnut Hill, (2) between County and Boston Post Roads and (3) in the triangle formed by Patch Hill, Eagle Rock and Christian Hill. Another bedrock aquifer, located in Merrimack, is partially recharged in Amherst in the vicinity of Pond Parish Road. A Milford aquifer located in the Ponemah Hill area is also partially recharged in Amherst. Insufficient data were available to undertake a numerical analysis of groundwater flow quantities and qualities. Recently concern has been expressed by the New Hampshire Geological Service that these bedrock aquifers are suffering a reduction in water supply due to development. They recommend that the bedrock aquifers should be monitored and future planning should consider the stress placed upon these bedrock aquifers. Amherst has been collecting well information, including yield tests, for all new wells constructed in the Town. This information will prove useful for future planning.

The Souhegan aquifer is the most significant deposit of stratified drift in the region. Three large wells currently withdraw water from this aquifer, the two Curtis wells in Milford withdraw a combined total of approximately 1 million gallons per day and the same amount is withdrawn from the Bon Terrain well by Pennichuck Water Works. The Curtis wells, Milford's only source of public water, serve about 3,000 customers. The former Amherst Village District well, now owned and operated by Pennichuck Water Works, and the Bon Terrain well serve 513 customers in Amherst on an alternating schedule. Surplus water from the Bon Terrain well is used by Pennichuck to supplement supplies in Nashua.

Given the reliance of Milford on the Souhegan aquifer and the potential for the aquifer to yield significant amounts of water, it is imperative that Amherst and the surrounding communities take efforts to protect this aquifer. Amherst's Aquifer Conservation District prohibits outdoor storage of road salt and dumping of snow containing de-icing materials; solid waste disposal sites; septage disposal sites, automotive repair shops, junkyards, and salvage operations; on-site storage of hazardous waste or toxic materials except temporarily as necessary in the ordinary course of business; residential underground hazardous fuel storage tanks; and filling/gas stations. The District also places special conditions on all uses in the district relative to septic systems, temporary storage of solid and liquid wastes, installation of monitoring wells for facilities utilizing or storing hazardous wastes, subsurface storage of petroleum products, use of pesticides, herbicides, fertilizers and other potentially dangerous leachables. Maximum impervious coverage in the District is 70 percent and stormwater drainage must be collected in catch basins or settling basins before leaving the site. In addition, the 101A corridor is zoned for industrial and commercial uses. One of the best protections for

MAP III-2
GROUNDWATER



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Source: USGS, 1986
Hydrogeology of Stratified-Drift Aquifers and Water Qaulity in the NRPC Area, South-Central New Hampshire

the aquifer would be to provide sewer service to the commercially and industrially zoned areas of the aquifer. The Town of Amherst should investigate all opportunities to provide sewer service to the aquifer area, particularly the Bon Terrain industrial park.

POTENTIAL THREATS

Nonpoint pollution sources (NPSs) represent the greatest threat to surface and groundwater resources in Amherst. NPSs include landfills, hazardous waste sites, urban runoff, subsurface waste disposal, road salt, nutrients and pesticides from commercial, agricultural and residential sources. The NH Department of Environmental Services Water Supply and Pollution Control Division maintains and distributes an "All Sites Listing" comprised of several sub-lists including: the Groundwater Hazard Inventory, the Hazardous Waste Site Inventory, the list of large underground storage tanks, the list of lined and unlined landfills and dump sites, and a list of junkyards. As the information on this list is updated regularly, the Town of Amherst should obtain a copy of the list on a regular basis. In addition, the Town should undertake all measures within its control to decrease the impacts of NPSs on surface and ground water. The Town's commitment to maintaining quality water resources is illustrated in the no salt/limited salt roads policy. In addition, the Town should continue to encourage the NH Department of Transportation to investigate options to its current road salting policy.

WATER RESOURCE RECOMMENDATIONS

The three watershed areas described above: Baboosic, Souhegan, and Witches Brook have distinct issues of concern:

Baboosic Lake Watershed - To preserve the fragile lake water quality, immediate measures should be taken:

1. Education: Inform all residents within the Shorelands Protection Zone of regulations that apply to them - fertilizer usage, tree cutting, etc.

2. The Town should consider a program to require annual pumping of all septic systems on nonconforming lots in the Baboosic Lake watershed and require proof of pumping with payment of municipal taxes.

3. Work with Merrimack to explore possibilities of sewer installation.

4. Support the efforts of the Baboosic Lake Association.

5. Continue to support the water monitoring program.

Souhegan, Beaver Brook Watershed - To maintain its invaluable recreational and scenic attributes as well as maintain its high water quality and quantity:

1. See recommendations in the *Souhegan River Corridor Study and the Souhegan River Watershed Study*.

2. The Pennichuck Water Company is concerned about maintaining the quality of water in its Thorntons Ferry wellhead protection area, and has begun an education program regarding safe septic usage by sending out a letter to residents in the Beaver Brook watershed.

Curtis Wellhead Protection District:

1. Cooperate with Milford in establishing a wellhead protection district. This would have minimal effect in Amherst as it falls in an area with few roads (Merrimack Rd from 122 west, Holt Road, and area south to Milford).

Witches Brook, Stump Pond, Pennichuck Watershed:

1. Work closely with Pennichuck Water Company - Include Pennichuck Water Co. engineers in the site plan review process for properties in its watershed, especially Stump Pond and the 101A corridor.

2. Compliance with Amherst Aquifer Conservation District: C. 8 "Storm water drainage from Aquifer sites shall be collected into catch or settling basins before leaving sites." P A 48.

3. Develop an education program to inform the general public about the watershed, the impacts of bacteria and nutrients on water quality and to demonstrate the benefits of reducing bacteria and nutrient loadings.

4. Incorporate requirements for the use of structural best management practices (BMPs) to capture and treat stormwater before discharging it into a tributary or water body.

5. Conduct a sanitary survey of the entire watershed to identify faulty and failed septic systems, and illicit discharges.

Prime Wetlands

1. Reconsider establishing the Stump Pond area as a Prime Wetland.

2. Conduct a wetland evaluation for the Town.

General Recommendations:

1. Educate people in the Shoreland Protection Zone about their responsibility to protect public water.

2. Enact local zoning ordinances to specifically exclude parking lots from the woodland buffer zone unless they are equipped with new innovative catch basins and other stormwater management techniques.

NATURAL AND CULTURAL AREAS

One of Amherst's most unique cultural resources is its trademark Village Center. To "preserve and enhance the small town character of Amherst and its unique colonial center" was identified as a high priority in the last Master Plan. The area is described by the Historic District Ordinance as "of unique character and architectural nature which can contribute significantly to the attractiveness of the Town." In addition, a part of the Town's Historic District is listed on the National Register of Historic Places. The actual protected Historic District is indicated on the Zoning Map.

Ponemah Bog and Great Meadow are the two other major 'special' features of the community. Great Meadow is located in the central part of Town in the area around Wilkins School. Ponemah Bog is located in southern Amherst in the Souhegan River floodplain. Both of these marshy areas are not only extremely important and sensitive parts of the local ecosystem, but they are also valuable educational, passive recreation and scientific resources. Ponemah Bog is nationally recognized by the Audubon Society as an environment for many unique and endangered plants.

Another important natural resource of the community is conservation land. There are over 1,500 acres of Town conservation land in Amherst, including tax deeded lots that are managed for conservation. The conservation lands and their acreages are depicted on Map III-3 and listed below.

TABLE III-3
TOWN CONSERVATION LAND

Name:	Joe English Reservation	*Area:*	373 acres combined
Location:	Northwest part of Amherst, off both sides of Brook Road		
Name:	Arnold Land	*Area:*	119 acres
Location:	Brook Road - adjacent to Joe English		
Name:	Peabody Mill	*Area:*	7.5 acres
Location:	Brook Road - adjacent to Joe English and the Arnold Land		
Name:	Pond Parish Town Forest	*Area:*	173 acres
Location:	Pond Parish, Spring Roads		
Name:	Arnold Land	*Area:*	92 acres
Location:	West side of Nathaniel Drive		
Name:	Lorden Land	*Area:*	60 acres
Location:	West side of Nathaniel Drive, adjacent to Arnold parcels		
Name:	Hazeltine Lands	Area:	128 acres combined
Location:	2 separate pieces of land. One fronts on Austin Road and the other is located just off of Austin Road between Arnold properties.		
Name:	Wilkins Parcels	*Area:*	68 acres combined
Location:	South of Lyndeborough Road		

TABLE III-3 (Continued)

Name:	Smith Land	*Area:*	8 acres
Location:	South of Lyndeborough Road, adjacent to and surrounded by Wilkins Land		
Name:	Merrill Land	*Area:*	2 acres
Location:	South of Lyndeborough Road, adjacent to Smith and Wilkins Land.		
Name:	Dacquino Land	*Area:*	70 acres
Location:	Bounded on west by Dodge Road and on the East by Rt. 101. Part of the Bicentennial Trail runs through this parcel.		
Name:	Great Meadow	*Area:*	61 acres
Location:	Between Boston Post Road across from Wilkins School and Jacobsen's Farm on Christian Hill Road.		
Name:	Towne Property	*Area:*	1.5 acres
Location:	On Boston Post Road, adjacent to Great Meadow.		
Name:	Eaton Road Parcels	*Area:*	59 acres
Location:	Both sides of Eaton Road and adjacent to edge of Great Meadow property		
Name:	Scott Land	*Area:*	39 acres
Location:	Both sides of the Souhegan River, bordering Boston Post Road & Thorntons Ferry II and adjacent to the Sherburne Land.		
Name:	Sherburne Land	*Area:*	10.27 acres
Location:	Souhegan River is back boundary, Simeon Wilson Road is front boundary. Opposite Souhegan High School.		
Name:	Caeser's Brook Reservation	*Area:*	40 Acres
Location:	off Mont Vernon Road		
Name:	Minot Ross Bird Sanctuary	*Area:*	21 acres
Location:	Bounded on the south by Thorntons Ferry, on the east by Route 101; on the north and west by lots fronting on Thatcher Drive and Cobbler Lane.		
Name:	Boston & Maine (B&M) Trail	*Area:*	18 acres
Location:	Between Walnut Hill and Baboosic Lake Road - old railroad bed		
Name:	Bertha Roger's gift	*Area:*	17.5 acres
Location:	Green Road		
Name:	Carey Development Lot	*Area:*	10 acres
Location:	Thornton's Ferry II		
Name:	Luby Lot	*Area:*	10 acres
Location:	Corner of Candlewood Drive and Lyndeborough Roads		
Name:	Morgan Lot	*Area:*	9 acres
Location:	Between Little Baboosic Lake and Baboosic Lake Road		

TABLE III-3 (Continued)

Name:	Beacon Associates	*Area:*	8 acres
Location:	Landlocked parcel between Fairway Drive and Boston Post Roads, adjacent to Hodgeman State Forest		
Name:	Davis Land	*Area:*	6 acres
Location:	Off Old Mont Vernon Road		
Name:	Monahan Land	*Area:*	4 acres
Location:	Lots in Holly Hill		
Name:	Beaver Brook Park	*Area:*	2 acres
Location:	Junction of Manchester and Mack Hill Roads		

Source: Amherst Conservation Commission, 1998.

CONSERVATION LAND RECOMMENDATIONS

While preserving open land in general is important, large contiguous tracts of undeveloped land are far more important to wildlife and natural resource preservation than small fragmented pieces. The Town should continue to support land acquisition of contiguous parcels whenever possible.

If the Amherst section of the New Boston Tracking Station were to become available, the Town should act immediately. The area should be left in its pristine state, as it is extremely valuable for watershed protection as well as wildlife habitat.

GREENWAYS, CORRIDORS AND BUFFERS

In the last decade, the term "greenway" has come more and more into use. The greenway concept is not new, but under this term new findings and approaches are being incorporated into open space and community planning. Sometimes different terms are used interchangeably, sometimes with specificity.

"Greenway" often is used in connection with passive recreation such as a bike, hiking or cross-country ski trail. For these purposes, the width of the corridor need only be a few feet although, users will certainly obtain more enjoyment when using a wider, more isolated path. "Wildlife Corridor" may be used in the conservation sense for an extended land strip established with wildlife movement or preservation in mind. The corridor may connect larger reservations such as the Pond Parish Town Forest to the Bragdon Farm and Joe English/Pulpit Rock areas. "Riparian Buffers" provide a corridor along a river, stream or water body. Buffers have many attributes from aesthetics to shading the stream, providing shelter and passage for wildlife and enhancing water quality through sediment removal and chemical changes to pollutants in runoff water.

Of course, corridors may serve multiple functions and go beyond connecting natural features to joining recreational and cultural sites as well. In all cases, the greater the width that can be provided, the more satisfying will be the corridor to all users - wildlife and humankind. It bears repeating again and again, the greater the buffer or corridor width, the better! A buffer (setback) of one hundred feet from a wetland or other conservation feature looks substantial on

a subdivision plan, but homeowners and children playing may expand their activities into the setback strip thereby putting pressure on the natural denizens and defeating its habitat protection value even if water quality (also important) is protected. Developers should be encouraged to provide as much buffering as possible beyond the ordinance requirements.

Open space in whatever form, fields, woods or wetlands, is an expected if not essential element of Amherst's land use pattern. A limited amount of open space exists in the town and it is being found in smaller parcels. From an environmental viewpoint, the space that we are able to set aside will be more effective if it can be contiguous. For instance, the open space fraction (50%) of one subdivided parcel should be engineered to abut that of an adjoining subdivision or other protected open space. Through this mechanism the land will be less fractured and a major step towards developing wildlife corridors will have been taken.

Part of the environmental character or heritage of this town lies in the diversity of the resident species from the large quadrupeds of the Joe English area to the sundews of Ponemah Bog. In all our planning, deliberate steps should be taken to preserve and enhance biodiversity in the town and region. A connecting thread of protected land between larger reserves is better than none and may provide for the biker. But wider corridors are needed for species movement and breeding and for water quality protection. For the latter, a 150-foot buffer seems to be a compromise minimum width. For wildlife, a few hundred feet is preferable. (For larger water bodies and streams state law places additional requirements.)

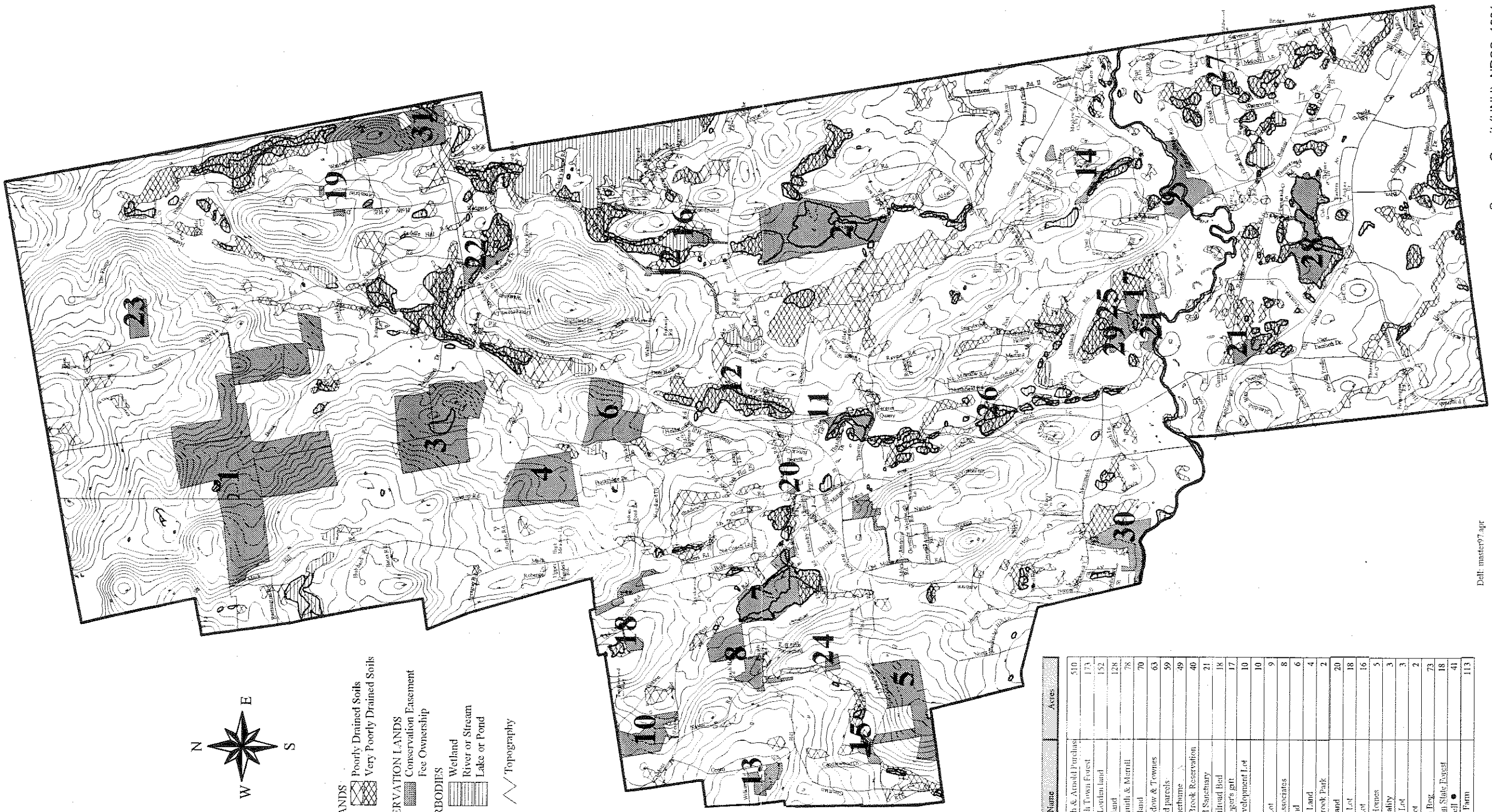
For purposes of planning residential growth, one acre preserved as open space may serve as well as another; however, from a wildlife viewpoint, the less the remaining space in town is fractured, the better. Maintaining the continuity inherent in a greenway or buffer is important. Animals and birds need space for breeding. First, a way to travel to find the mate to maintain the species. Second, space is needed to raise young without human pressure, domestic cat pressure and pressure from competing species. A diverse community of plants and animals depends on space arranged in a way that wildlife can use and survive within. Amherst is home to at least one federally endangered species and other at risk species. The Conservation Commission needs support in its efforts to protect the habitats of these species.

Preparing a specific list of parcels that would constitute the suggested corridors we would like to see evolve would be risky (by appearing to dismiss others), restrictive (by not allowing future options) and even misleading. In certain areas definite parcels, or portions of them, stand out as satisfying the objectives outlined above. In other sections of town especially where many medium-sized parcels fill the area, a route is not obvious until one or more landowners come forward.

Five principal protected corridors are envisioned:

1. A riparian buffer on both sides of the Souhegan River. This should extend at least 150 feet back from each bank and be managed for stream bank protection and runoff filtration. A riparian buffer should support a mix of plant species from ground cover to shrubs and trees. The mix is important if the buffer is to do the job of removing suspended sediment in surface runoff and chemical fixation of dissolved ions. Lawn grass beside the water is better than pavement but a mix of species is necessary to be most effective

MAP III-3
CONSERVATION AND WETLANDS



Name	Acres
1. Joe English & Arnold Purchase	510
2. Pratt Parish Town Forest	173
3. Arnold & Lorden land	152
4. Hazelline land	128
5. Wilkins, Smith & Merrill	78
6. Dacquino land	70
7. Great Meadow & Townes	63
8. Eaton Road parcels	59
9. Scott & Sherburne	49
10. Caeser's Brook Reservation	40
11. Ross Bird Sanctuary	21
12. B&M Railroad Bed	18
13. Bertha Rogers gift	17
14. Carey Development Lot	10
15. Luby Lot	10
16. Morgan Lot	9
17. Beacon Associates	8
18. Davis Land	6
19. Monahan Land	4
20. Beaver Brook Park	2
21. Currier Land	20
22. Sylvester Lot	18
23. Gelinas Lot	16
24. Yankee Homes	5
25. Wells Realty	3
26. Melendy Lot	3
27. Glover Lot	2
28. Penemah Bog	73
29. Hedgeman State Forest	18
30. Curtis Well ●	41
31. Brigden Farm	113

● Note: Owned by the Town of Milford

Source: Granit (UNH), NRCS, 1981.

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2. A wider corridor along the route of the existing Bicentennial Trail that runs from near the village to the Bragdon Farm. This corridor borders the marshes beside Route 101 at Baboosic Lake Road, the shore of Little Baboosic Lake (formerly Weldon Pond) and old farmland. It qualifies as a corridor that enhances wildlife movement and breeding, recognizes the former B&M Railroad construction as a cultural feature and is actively used recreationally. The latter use could be enhanced by securing additional right of way and improving the trailway for bicycle use.

3. A Pond Parish Corridor running from the Merrimack town line to the B&M corridor described in 2 above for wildlife and passive recreation. This greenway will include present town owned land and private lands yet to be protected. Much of this corridor lies over an aquifer recharge area. These corridor lands hold the potential for being second only to the land in the northwest corner of town in wildlife habitat and passive recreation potential. They are also enticing developable property which if developed would change the character of the east side of town. A continuation of this area of wetlands and woods extends into Merrimack. Amherst officials should work with their counterparts in Merrimack to establish a protected resource approaching 1000 acres in area.

4. A northern corridor which would be an extension of number 2 above extending from the Bragdon Farm to Joe English Reservation and the Bedford Land Trust Pulpit Rock property. This route is defined best at present with a fuzzy, broad brush or a vector since it lies almost entirely across smaller, privately owned parcels.

5. A village to village corridor from the Amherst village to Milford. This would cross Great Meadow near Wilkins School, as yet unprotected property, and Conservation Commission lands off Lyndeborough Road. This corridor will feature wildlife movement, viewscape protection around the village and potential for a walking trail.

It must be emphasized that land that does not appear to be a part of one of these specific routes should not be ignored or dismissed as having no environmental attributes. Where greenways have been established, they are found to bring benefits such as:

1. Protecting ecologically sensitive or endangered corridors, and providing important connecting links among reserved areas and ecosystems.

2. Enhancing neighborhood quality of life, and creating a greater community "sense of place."

3. Providing local routes for hiking and other passive forms of recreation.

4. Raising property values and increasing the community appeal to new enterprises.

To these ends and the general environmental enhancement of the Town the following recommendations are offered:

1. There are many private and governmental sources for grants to benefit conservation, land rights acquisition and recreation in the community. Many

factors affect the successful application for these funds; including, knowledge of the grant's availability, knowledge of the needs, skill in grantsmanship and time to pursue the process. The Town needs to develop a purposeful mechanism to identify grant sources, match them to needs, establish priorities and perfect an aggressive application process.

2. Many parcels of land become town-owned through failure of the owner to pay taxes. It is recommended that a conservation restriction, when appropriate, be placed on all such properties and management of the properties be assigned to the Conservation Commission when applicable.

3. The wetlands and ponded areas on either side of Pond Parish Road should be included with Great Meadow and Ponemah Bog as Areas of Environmental Concern due to their wildlife and aquifer recharge attributes.

4. Dialogue and positive steps should be initiated to make available for unsupervised passive recreation the Amherst land in the low security area of the New Boston Air Station.

5. Town planning and the zoning ordinance should incorporate the concepts and objectives of the greenways section of this plan.

6. The Town should expand its efforts to preserve and protect open space parcels as they may become available through purchase of development rights or in fee purchases. To do this, tax dollars should be added to the Conservation Commission Land Purchase account in addition to the amounts obtained from land use change fees. A minimum investment of $250,000 (50 acres-) per year is recommended.

7. Residents desiring to preserve the open space character of their town should be able to find encouragement and support from town agencies and in town policies. The Town through its agencies should encourage landholders to take steps that will preserve the character of undeveloped parcels.

8. A joint subcommittee of the Recreation and Conservation Commissions should be empowered to manage town-owned properties on which both conservation and recreation activities are permitted and logical uses. This will allow joint use for passive recreation and education to proceed at the commission level without unnecessary escalation to the Selectmen or administration level.

9. Town officials should actively pursue with their counterparts in adjoining towns' policies and programs which will compliment conservation and passive recreation activities.

ENVIRONMENTAL EDUCATION IN AMHERST

The world has become increasingly aware of the importance of environmental education, as witnessed by the growth of national and world how-to conferences on the subject and the appearance of "Environmental Education" majors in most colleges across the US. The

Amherst Conservation Commission has taken an active role in environmental education for the Town and has often been a trendsetter in the field. This role should continue.

AMHERST CONSERVATION COMMISSION
ENVIRONMENTAL EDUCATION

Activities:

Scholarships for high school youth for environmental camps
Support for Hartshorn Summer Program - an environmental education program for youth from kindergarten through middle school started in 1990 by commission members.
Support for environmental educator in public schools during school year - started by an ACC grant in 1991.
Peabody Mill Center purchase, startup and programming
"Conservation and More" column in the Amherst Citizen
Educational display on July 4th
Support for high school science programs and senior projects
Sponsor free public programs for families and homeowners
Maintains a website

Recommendations for the future:

The Amherst Conservation Commission, the schools, and the recreation department should continue the role of advocate of quality environmental education programs. It is through education that citizens will continue to be respectful of and willing to sustain our high-quality environment.

RECOMMENDATIONS

The following recommendations for action are summarized from the foregoing sections of this chapter. They are intended to help steer the course the Master Plan lays out and fill gaps of omission in current procedures.

Open Space

1. The Town should expand its efforts to preserve and protect open space parcels as they become available through the purchase of development rights, easements or fee purchases.

2. When appropriate, a conservation restriction should be placed on parcels of land that become town-owned through failure of the owner to pay taxes. The Board of Selectmen should assign management of the properties to the Conservation Commission when applicable.

3. Raise the allocation of Current Use recovery money from the present 50% for fee purchases by the Conservation Commission. This action would require Town Meeting approval.

4. Illustrate the financial advantages to landowners of selling their property to the Commission and exemplify the special sense of donation to their community by selling land to the Conservation Commission.

5. *Obtain grants to benefit conservation, land rights acquisition and community recreation, the Town needs to develop a purposeful mechanism to identify grant sources, match them to needs, establish priorities and perfect an aggressive application process. (Board of Selectmen)*

6. Residents desiring to preserve the open space character of their town should be able to find encouragement and support from town agencies and in town policies. (Board of Selectmen)

Contiguous Lands

1. The open space fraction of one subdivided parcel should be engineered/designed to abut that of an adjoining subdivision or other protected open space. (Planning Board)

2. Developers should be encouraged to provide as much buffering as possible beyond the ordinance requirements. (Planning Board, Zoning Office)

3. Support acquisition of contiguous parcels as a strategy to protect open space. (Conservation Commission, Town Meeting)

Greenways

1. Incorporate the concepts and objectives of the greenways section of this plan. (Planning Board, Zoning Office)

2. Amherst officials should work with their counterparts in Merrimack to establish a Pond Parish Corridor as a protected resource approaching 1,000 acres in area. (Conservation Commission)

Forest Management

1. Pursue forest management in town owned lands with the strategy of enhancing wildlife habitat as well as income, according to the details in the Town Forest Management Plan. (Conservation Commission)

2. Plan to provide replacement trees in residential areas and the village center in particular. (Tree Committee)

Baboosic Lake Watershed

1. Amherst town officials should continue to monitor unauthorized conversion of seasonal cottages into year-round residences. (Zoning Office)

2. Inform all residents within the Shorelands Protection Zone of regulations that apply to them - fertilizer usage, tree cutting, etc. (Zoning Office)
3. Conduct detailed sanitary survey of first tier homes and cottages for failing septic systems. (Board of Selectmen)

4. The Town should consider a program to require annual pumping of all septic systems on nonconforming lots in the lake watershed. Require proof of pumping with payment of town taxes. Work with Merrimack to explore possibilities of sewer installation. (Board of Selectmen)

5. Support the efforts of the Baboosic Lake Association especially for phosphorus use reduction. (Conservation Commission)

6. Support lay monitoring of lake water and provide means to educate public about water quality. (Conservation Commission)

Witches Brook, Stump Pond, Pennichuck Watershed

1. Include Pennichuck Water Works engineers in the site plan review process for properties in its watershed, especially Stump Pond and the 101A corridor. (Zoning Office)

2. Develop an education program to inform the general public about the watershed, the impacts of bacteria and nutrients on water quality and to demonstrate the benefits of reducing bacteria and nutrient loadings.

3. Conduct a sanitary survey of the entire watershed to identify faulty and failed septic systems, and illicit discharges.

Prime Wetlands

1. Establishing the Stump Pond and Ponemah Bog areas Prime Wetlands. (Conservation Commission)

Amherst Portion of New Boston Air Force Station

1. Work with Air Force officials to make the Amherst land in the low security area of the New Boston Air Force Station available for unsupervised passive recreation. (Conservation Commission)

2. Make plans, contacts, forms, etc. to be able to act immediately if the Amherst section of the New Boston Air Force Station becomes available. (Conservation Commission)

Curtis Wellhead Protection District

1. Cooperate with Milford in establishing a well head protection district for the Curtis wells. (Board of Selectmen)

2. Educate people in this zone about their responsibility to protect public water. (Planning board)

Pond Parish Area

1. The wetlands and ponded areas either side of Pond Parish Road should be included with Great Meadow and Ponemah Bog as Areas of Environmental Concern. (Planning Board)

Major Public Water Bodies

1. Implement the standards of the Comprehensive Shorelands Protection Act (RSA 483-B) which became fully effective on July 1 1994, to protect and conserve the following qualifying public water bodies; Baboosic Lake, Little Baboosic Lake, Damon Pond, Joe English Pond, Lincoln Pond, Honey Pot Pond, Stump Pond and the Souhegan River. (Planning Board)

Aquifer

1. Provide sewers in commercially and industrially zoned areas of the aquifer along 101A. (Board of Selectmen, Planning Board)

2. Monitoring wells should be established in the bedrock aquifers to track recharge and discharge levels, and to provide information for future planning.

Town-wide

1. Replace the High Intensity Soil Survey (HISS) standards in the Subdivision and Site Plan Regulations to require the use of the Site Specific Soil Standards for future applications. (Planning Board)

2. Amend the zoning ordinance to exclude parking lots from the woodland buffer zone. (Planning Board)

3. Evaluate the existing wetlands regulations and recommend changes; i.e., require that a 25 foot non-disturbance area be maintained within the 50 foot structure setback. (Conservation Commission, Planning Board)

4. Incorporate requirements for the use of structural best management practices (BMPs) to capture and treat stormwater before discharging it into a tributary or water body.

5. Continue the role of advocate of quality environmental education programs. (Conservation Commission, Recreation Commission, School Districts)

Joint/Combined Operations

1. A joint subcommittee of the Recreation and Conservation Commissions should be empowered to manage town-owned properties on which both conservation and recreation activities are permitted. (Recreation Commission, Conservation Commission)

2. Town officials should actively pursue policies and programs which will compliment conservation and passive recreation activities with their counterparts in adjoining towns. (Board of Selectmen, Recreation Commission, Conservation Commission)

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